

Remarks

Claims

Applicants note that the numbering of the claims as originally filed inadvertently skipped claim number five (5). Accordingly, there are presently 19 claims, rather than a total of 20. For the sake of consistency, Applicants have not amended the claim numbers.

Claims 1-4 and 6-20 are pending in the application. All claims stand rejected under 35 USC § 102(b) as being anticipated by U.S. Patent No. 5,957,933 to Yanof *et al.* (Yanof).

Claim 1 has been amended. Claims 2-4 and 6-20 remain in the application unamended.

Rejections under 35 USC § 102(b)

Claim 1, as amended is directed to a medical imaging system for conducting an image-guided medical procedure on a subject, the system comprising a medical imaging apparatus for obtaining volumetric images of the subject; means for planning an interventional procedure on a subject using the volumetric images; a mechanical arm assembly disposed in proximity to the medical imaging apparatus, the mechanical arm assembly comprising a base support, a distal end, a plurality of arm segments, and a plurality of joints between the arm segments for carrying out the interventional procedure; and an end-effector disposed at the distal end of the mechanical arm assembly, the end-effector comprising gripping means for selectively gripping a surgical instrument during the interventional procedure with a gripping force ranging from zero to a force which prevents relative movement between the gripping means and the surgical instrument.

The '933 patent to Yanof *et al.* is directed to a mechanical arm guided minimally invasive surgical tools. More specifically, the '933 patent discloses a surgical instrument including a laser guided biopsy needle 38 carried by a combined laser and cannula guidance device 102. *See*, Yanof *et al.*, column 4, lines 5-8. With particular reference to FIG. 2 and its accompanying text at column 7, lines 44-53, the '933 patent teaches that the interchangeable surgical instrument guidance device illustrated is a combined laser and cannula guidance device 102 including an

upwardly disposed top end effector member 104 carrying a laser light emitting source 108 and a downwardly disposed bottom end effector member 106 carrying a pair of opposing cannula needle guide elements 110, 112. The opposing needle guide elements are biased together into the position illustrated by a retractable tweezer unit 114. The spring constant that biases the opposing needle guide elements together is selected to be both rather stiff to accurately guide surgical instruments and to be somewhat flexible to release the surgical instrument in response to unexpected gross patient movement. *See Yanof et al.*, column 9, lines 6-10.

As set forth above, the '933 patent teaches a pair of opposing cannula needle guide elements for guiding a needle through the needle guide 152 as shown in FIG. 4. The '933 patent does not teach or suggest gripping means for selectively gripping a surgical instrument during the interventional procedure with a gripping force ranging from zero to a force which prevents relative movement between the gripping means and the surgical instrument as set forth in claim 1.

In light of the foregoing, Applicants respectfully assert that claim 1 is patentable over the prior art of record and request that the rejection under § 102(b) be withdrawn.

Claim 2 is directed to the medical imaging system according to claim 1 wherein the end-effector further comprises a first finger portion having a first gripping surface; a second finger portion having a second gripping surface, the first and second gripping surfaces being opposed to one another for applying a gripping force to the surgical instrument; a first surgical instrument guide disposed on the first finger portion and extending towards the second finger portion; and a second surgical instrument guide disposed on the second finger portion and extending towards the first finger portion.

As noted above in connection with claim 1, the '933 patent teaches that the interchangeable surgical instrument guidance device illustrated is a combined laser and cannula guidance device 102 including an upwardly disposed top end effector member 104 carrying a laser light emitting source 108 and a downwardly disposed bottom end effector member 106 carrying a pair of opposing cannula needle guide elements 110, 112.

The Office Action does not identify in the '933 patent all of the limitations of claim 2 and Applicants respectfully assert that the '933 patent does not teach or suggest all of the limitations of claim 2.

In light of the foregoing, and for at least the reasons set forth above in connection with the patentability of claim 1, Applicant assert that claim 2 is patentable over the prior art of record.

Claim 3 depends from claim 2 and is directed to a medical imaging system further comprising incremental movement means for incrementally inserting the surgical instrument along a trajectory into the subject.

As set forth above, the '933 patent discloses a combined laser and cannula guidance device 102 including an upwardly disposed top end effector member 104 carrying a laser light emitting source 108 and a downwardly disposed bottom end effector member 106 carrying a pair of opposing cannula needle guide elements 110, 112.

While the guidance device in the '933 patent provides guidance for an element such as a needle, the '933 patent does not teach or suggest means for incrementally inserting a surgical instrument along a trajectory as set forth in claim 3.

In light of the foregoing, and for at least the reasons for patentability as set forth above in connection with claims 1 and 2, Applicants respectfully assert that claim 3 is patentable over the prior art of record.

Claim 4 depends from claim 3. For at least the reasons for patentability as set forth above in connection with claim 3, Applicants respectfully assert that claim 4 is patentable over the prior art of record.

Claims 6 and 7 depend from claim 2. For at least the reasons for patentability as set forth above in connection with claims 1 and 2, Applicants respectfully assert that claims 6 and 7 are patentable over the prior art of record.
, 6, and 7 ultimately depend from claim 2

Claim 8 depends from claim 7. For at least the reasons for patentability as set forth above in connection with claim 7, Applicants respectfully assert that claim 8 is patentable over the prior art of record.

Claim 9 is directed to a method of conducting an image-guided medical procedure on a subject, the method comprising: generating at least one volumetric

image of the subject; planning an interventional procedure on the subject using the at least one volumetric image; gripping a surgical instrument with an end-effector, the end-effector being disposed at a distal end of a mechanical arm assembly; moving the surgical instrument into the subject along a trajectory in accordance with the planned interventional procedure using the mechanical arm assembly; and releasing the surgical instrument.

As set forth above, the '933 patent is directed to guiding a surgical instrument. The '933 patent does not teach or suggest gripping and moving a surgical instrument as set forth in claim 9.

In light of the foregoing, Applicant respectfully assert that claim 9 is patentable over the prior art of record.

Claim 10 depends from claim 9 and is directed to the method of conducting an image-guided medical procedure further comprising the steps of: moving the end-effector away from the subject; regripping the surgical instrument; and moving the surgical instrument further along the trajectory.

As set forth above, the '933 patent does not teach or suggest gripping and regripping the surgical instrument, and moving the surgical instrument as set forth in claim 10. Accordingly, and for at least the reasons for the patentability of claim 9, Applicants assert that claim 10 is patentable over the prior art of record.

Claims 11-14 ultimately depend from claim 9. For at least the reasons for patentability set forth above in connection with claim 9, Applicants assert that claims 11-14 are patentable over the prior art of record.

Claim 15 is directed to a medical imaging system comprising: imaging means for generating at least one volumetric image of a subject; planning means for planning an interventional procedure on the subject; a mechanical arm assembly disposed in proximity to the imaging means, the mechanical arm assembly comprising a base support, a plurality of arm segments, a plurality of joints, and a distal end; an end-effector disposed at the distal end of the mechanical arm assembly, the end-effector comprising: a first finger portion having a first gripping surface; a second finger portion having a second gripping surface, the first and second gripping surfaces being opposed to one another for applying a gripping force to a surgical instrument; a first surgical instrument guide disposed on the first finger portion and extending

perpendicularly to the first gripping surface; and a second surgical instrument guide disposed on the second finger portion and extending perpendicularly to the second gripping surface.

The reasons for patentability set forth above in connection with at least claims 1 and 2 can be applied *mutatis mutandis* to claim 15. Accordingly, Applicants respectfully assert that claim 15 is patentable over the prior art of record.

Claims 16-20 ultimately depend from claim 15. For as least the reasons for patentability of claim 15, Applicant assert that claims 16-20 are patentable over the prior art of record.

Conclusion

It is submitted that claims 1-4 and 6-20 distinguish patentably and non-obviously over the prior art of record and are in condition for allowance. An early indication of allowability is earnestly solicited.

If any extension of time or any fees are required relative to this Amendment A, Applicants hereby petition for such extension and provide the authorization to charge deposit account 14-1270 for any necessary fees.

Respectfully submitted,



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